Testing for Pollution Haven Behavior—Evidence from China

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Abstract:

This paper tests for Pollution Haven behavior by estimating the effect of changing environmental stringency on foreign investors' decisions on where to locate foreign direct investments (FDI) in China. Based on the theoretical framework of foreign investor behavior, I derive and estimate a location choice model using data on a sample of new FDI projects, Chinese effective levies on water pollution, and industrial pollution intensities in different provinces. Province specific-trends are also included into the estimation. Results show no support for the idea that investors favor lax environmental enforcement across Chinese provinces when making FDI location decisions.

I. Introduction

One of the most contentious and hotly debated issues today is the "Pollution Haven Hypothesis" (PHH), which is at the center of debates over international trade and the environment. This hypothesis predicts that stringent environmental regulations in developed countries lead to the relocation of pollution intensive production away from high income countries toward developing countries, where regulations are relatively weak. If these weak environmental standards in developing countries can be considered as another source of comparative advantage, it is reasonable to be concerned that governments may seek to attract foreign direct investment (FDI) by competitively undercutting each other's environmental regulations, and thus turning poor countries into "pollution havens". Alternatively, export or capital inflows can also be deterred by tighter environmental regulations, which Taylor (2004) calls a "pollution haven effect".

Many empirical studies have been done in searching for evidence for pollution haven behavior among firms, but these studies have come up with different conclusions. Eskeland and Harrison (2003) examine the pattern of foreign investment in four developing countries: Mexico, Morocco, Cote d'Ivoire and Venezuela, but find little evidence to support the PHH. Javorcik and Wei (2004) analyze the investment choices of multinational firms locating their investments across Eastern Europe and the former Soviet Union. However, they find no systematic evidence that FDI from "dirtier" industries is more likely to go to countries with weak environmental regulations. In contrast, Keller and Levinson's study focusing on the location of investment in the United States finds evidence of deterrent effects of abatement costs on foreign investments. More recently, Dean, et al. (2008) test for pollution haven behavior by estimating the determinants of location choice for equity joint ventures in China. Their results show that highly-polluting industries funded through Hong Kong, Macao, and Taiwan are attracted by weak environmental standards.

This paper tests for evidence of pollution haven behavior by asking whether FDI in different provinces in China has responded significantly to relative changes in provinces' environmental regulation stringency. Based on the methodological insights of previous studies, I use the model of FDI location choice in the presence of inter-provincial differences in environmental regulation stringency, as well as factor abundance. In contrast to previous studies, I also take different province growth patterns into account by adding province-specific trends. This allows me to compare the impact of environmental regulation stringency across provinces within China. I built a new dataset of new FDI projects in China across 27[1] provinces during the period of 1996-2003 and used data on actual collected water pollution levies to construct a measure of provincial environmental stringency. This dataset and detailed information on the levy system allows me to examine endogeneity concerns directly.

II. FDI and environmental regulation stringency in China

With the deepening of the Reform and Opening Up policy (*gaige kaifang*), China has attracted vast FDI inflows. In 2008, the amount of foreign direct investment inflows in China exceeded 100 billion dollars, and made China the world's third biggest foreign investment destination as well as the single largest recipient of FDI flows to the developing world. However, the distribution of FDI within China is highly unbalanced, mainly concentrated on the eastern costal area. This pattern is associated with different economic growth rates in different provinces. Figure 1 in the Appendix shows the changes of FDI and pollution in China over time. This figure does not contain enough information to fully explain the relationship between FDI and pollution; however, we can gain a general idea of the initial movements of these two important figures.

Environment protection started to draw attention in 1970s, and has become a priority of the Chinese

[1] Data of actually collected water pollution levies for Beijing, Tianjin, Shanghai and Tibet is missing.

government recently. Numerous environmental policies have been implemented by the central government and provincial governments to improve environment and control pollution. Among them, the water pollution control system and the water pollution levy system is the most fully developed mechanism in the Chinese pollution control regime. The discharge levy depends on the pollutant, concentration and the volume of emissions. Though the tax rate of each pollutant is set by central government at national level, concentration standards are set jointly by central and provincial governments, thus they vary across provinces. A levy is applied if the concentration of pollutants in a firm's wastewater exceeds the local concentration standard[2].

Based on the conclusions of previous studies[3], these fines typically reflect regulatory statutes. Thus, I use the data on total collected levies and wastewater to create a measure of de facto provincial environmental regulation enforcement –the average collected levy per ton of wastewater, which is also the effective tax rate. Provinces that have lower effective tax rates will receive less tax revenues and, all else equal, will have lower measured regulation enforcement. If reductions in abatement costs matter to investors, their location choices across China will be evident as pollution haven behavior. Table 1 in the Appendix shows period average[4] data on collected levies, total amount of wastewater and average collected levy per ton of wastewater for each province.

III. Empirical analysis

Modeling foreign investor behavior: Given the scale and scope of FDI surging into China, it is less likely to be driven by environmental policy, and therefore take the decision to invest in China as exogenous. When a multinational firm is considering investing somewhere in China, the objective of the firm is to choose the host province where the cost structure will yield the highest profit. Profit depends on

[2] In 1993, a fee on all wastewater was imposed by the national government.
[3] Dasupta et al. (1997) conclude from plant-level data.
[4] Period: 1995 to 2002, variables are lagged one year

the abatements costs as well as other factors. Environmental regulation stringency is defined as the effective tax rate that the firm faces for wastewater disposal, given its amount of wastewater. The best information on the effective tax rate a firm can obtain is based on last year's information, which is set before the firm's location decisions are made.

Thus, for a firm that is not meeting wastewater pollution standards, the maximum profit that can be earned in province j is the solution to:

$$\phi(\pi_{ij}) = p_i X_i - C^i(\mathbf{w_j}, R_j, X_i)$$

Where π_{ij} is the profit of firm i if it locates in province j, p_i is the producer price for a unit of X_i. As most of the products foreign firms produce will be exported, I assume the price is the world price and it is the same for different provinces. Later, I will relax the assumption by adding consumption per capita as a measure of domestic market price. C^i is a function of cost, $\mathbf{w}_j$ is a vector that contains prices of other factors in province j, and R_j is the effective tax rate for wastewater in province j. Other factors include labor, transportation and telecommunications. In addition, certain provincial characteristics, such as investment incentives will influence the location decisions.

Data description: I collected province-level data for 27 provinces, with the exception of Beijing, Tianjin, Shanghai and Tibet which had missing data from 1996 to 2003[5]. Variables such as road length, railroad length, telephones, and consumption are collected from Chinese Statistical Yearbooks. Data for roads, railroads, and telephones of Sichuan province for 1996 are missing. Summary data for provincial characteristics are shown in Appendix Table 1. Definitions and sources of variables are provided in Table 2 in the Appendix.

The dependent variable, number of new FDI projects in each province for each year from 1996 to

[5] Time period for lagged variables is 1995 to 2002

2003, is collected from provincial statistical yearbooks. New FDI projects are very cost-sensitive and have the lowest sunk costs in linking to a particular province, and can therefore have many different location options. Thus, the location decision of new FDI projects are based on province characteristics and locality cost factors, which includes abatement cost. The independent variable, average levy, is calculated as total collected water pollution levies over wastewater output. Data on total collected water pollution levies and wastewater pollution concentration is collected from Chinese Environmental Yearbooks.

Wages by skill level are not available, so I assume that relative labor supplies determine relative wages in each province. The data is collected from each year's China Statistical Yearbook and 2000 Population Census, which surveyed a 1% sample of the overall population. Skilled labor is defined as those with senior secondary or higher education, semi-skilled labor as those with primary and junior secondary level education, and unskilled labor as those are illiterate or have less than primary level education. From this data, I calculated the percentage of skilled and unskilled labor relative to the percentage of semi-skilled labor.

Several measures of infrastructure development are also included. Transport infrastructure is measured by the length of roads and railroads adjusted for provincial sizes, and telecommunications are measured by the number of urban telephone subscribers relative to the population. FDI incentives are constructed as a dummy, with provinces that have a special economic zone (SEZ)[6] or open coastal city (OCC) in the province labeled one.

All right hand variables except FDI incentives and ratio of skilled and unskilled labor, are lagged one year to represent predetermined information available to an investor at the time of the FDI location decision. Information on FDI incentives and labor education levels can be observed at the time of the

[6] Only consider national-level Special Economic Zones.

location decisions, and change more frequently relative to other infrastructure measures. In addition, these two controls are uncorrelated with environmental regulation enforcement.

Econometric Models: The baseline model here is two-way fixed effects. The advantage of using a fixed effects analysis is that it allows me to get rid of all unobserved observation-specific characteristics that are time-invariant, and thus solve the problem of omitted variable bias. A random effects analysis is not applied here because the assumption that there is no correlation between explanatory variables and unobservable province variation is not valid. Provinces with high pollution levels are more likely to impose stricter environmental regulations, and therefore have a higher effective tax rate for wastewater.

First I use province-level fixed effects to estimate the impact of environmental regulation stringency without any controls. The model is:

$$\boldsymbol{lnfdi_{it} = \beta_0 + \beta_1 lnlevy_{it} + \sum_{1997}^{2003} \delta Year_t + \alpha_i + \varepsilon_{it}} \tag{1}$$

Here "i" stands for province level variation and "t" stands for time variation. Time dummies for each year, with the exception of the first year, are included in the model to knock out the unobservable trends from each province. The model with control variables is:

$$\begin{aligned}\boldsymbol{lnfdi_{it}} &\boldsymbol{= \beta_0 + \beta_1 lnlevy_{it} + \beta_2 road_{it} + \beta_3 railroad_{it} + \beta_4 tele_{it} + \beta_5 skilledl_{it}} \\ &\boldsymbol{+ \beta_6 uskilledl_{it} + \beta_7 consp_{it} + \gamma_1 incen_{it} + \sum_{1997}^{2003} \delta Year_t + \alpha_i + \varepsilon_{it}}\end{aligned} \tag{2}$$

Here *skilledl* stands for skilled labor, *uskilledl* stands for unskilled labor, *consp* stands for consumption and *incen* stands for FDI incentive.

With provincial fixed effects, I knock out the unobservable provincial characteristics, and with year dummies I also knock out the unobserved time trends for each province. However, it is unlikely that there is one trend in growth over time in China. As economic growth for different provinces in different regions is dramatically different from each other, the growth trend of FDI for each province is also likely to be different. Appendix Figure 2 shows growth trend of FDI for typical province in different region. It is obvious that these provinces have different trends, thus instead of adding year dummy, we need to add province specific-trends to get a more precise estimator. Most previous studies failed to consider this unit specific-trend. Therefore, the model is:

$$\boldsymbol{lnfdi_{it} = \beta_0 + \beta_1 lnlevy_{it} + T_{it} + \alpha_i + \varepsilon_{it}} \quad (3)$$

$$\boldsymbol{lnfdi_{it} = \beta_0 + \beta_1 lnlevy_{it} + \beta_2 road_{it} + \beta_3 railroad_{it} + \beta_4 tele_{it} + \beta_5 skilledL_{it} + \beta_6 uskilledL_{it} + \beta_7 consp_{it} + \gamma_1 incen_{it} + T_{it} + \alpha_i + \varepsilon_{it}} \quad (4)$$

And $\boldsymbol{T_{it}}$ donates province specific-trends. With this trend, now I can estimate how environmental regulation stringency affects the slope of growth trend of FDI for each province. The above model is a more precise estimator of the impact of environmental regulation enforcement on FDI decision locations.

IV. Regression Results:

Two-way fixed effects: Regression results of models (1) and (2) are reported in Appendix Table 3. The estimated coefficients for the average levy in models (1) and (2) are very small and insignificant. Therefore, I find no support for a pollution haven effect in my sample. The estimated coefficients of other control variables are consistent with expected and results of previous studies. We expect all investors to be attracted to provinces with good infrastructure and abundant skilled labor supply. Also, firms seeking to sell into the local market are expected to be attracted to areas that have rich local markets, as measured by provincial consumption per capita. However, FDI incentives do not have a significant effect on attracting investment, which is surprising. Such unusual results may indicate misspecification and the impact of FDI incentives may be reflected through the change of slope of FDI growth trend.

Province specific-trends: Models (3) and (4) as shown in Appendix Table 3 allow for province specific-trends to fit the unique features of China, providing more precise estimates. Consistent with Models (1) and (2), the estimated average levy coefficient remains insignificant. Thus, inclusion of province specific-trends does not change the lack of support for the existence of a pollution haven effect. Estimators for infrastructure in Model (4) mirror the results in Model (2). Impact of FDI incentives become significant in Model (4) and the coefficient is positive, which is as expected. This also indicates that Model (4) with provincial fixed effects and province specific-trends is a more proper model. While Model (4) does render skilled labor insignificant and change the sign on the coefficient for unskilled labor. This may be because the ratio of skilled labor has similar growth trend with FDI in each province and there is relatively high inter-province mobility. Notably, the estimated coefficient of consumption per capita is now negative but remains significant. Consumption per capita is a measure of domestic market price, for firms selling into local market, high domestic price represents high revenue; however, for firms focusing more on export, where local products are inputs, high domestic prices represent higher costs. This finding explains why the sign on the consumption per capital coefficient flips in these two models if the growth trend of FDI is more driven by export oriented investors.

Impact of province initial environmental condition: One argument of environmental regulation stringency is that provinces that are initially "dirty" will have more strict regulation or enforcement, thus these provinces have relatively higher effective tax rates and influence investments location decision. On the other hand, one reason that one province is highly polluted is that it has implemented loose environmental regulation; therefore, such provinces will be more likely to attract investments with high pollution intensity resulting in turning dirty provinces dirtier and clean provinces cleaner. To test whether provincial initial environmental conditions will have an effect on location choice of foreign investors, I construct a dummy indicating environmental condition in the base year for each province, and interact it with average levy. The dummy is constructed based on chemical oxygen demand (COD) emissions (kg) per 1000 yuan industrial output. COD emissions are highly correlated with other water pollutants and account for the majority of Chinese pollution tax revenues (Wang and Wheeler, 2005). I calculate each province's pollution intensity (PI) in base year of my sample, the median number is 3.5. Thus, a province with PI higher than 3.5 is considered as pollution intensive and dirty and labeled as one for initial provincial environmental quality.

Since environmental conditions can only adjust in the long-run, it is reasonable to assume that each province's environmental condition doesn't change in my sample period, thus it is time-invariant. By interacting this dummy with average levy, which is a time-variant variable, I can introduce this interaction term into the provincial Fixed Effects model, and the dummy term itself is not needed because it is already captured by time-invariant unobservable. Therefore, I add the interacted term "$dirty_i \times levy_{it}$" in Models (1), (2), (3), and (4), and the regression results are shown in Table 4 in the Appendix.

The results are similar to the results in previous regressions, the estimated coefficient of average levy remains insignificant. In addition, the interacted term is not significant either, which indicates that foreign investors do not respond to different provincial environmental conditions. Thus, we can say the pollution levy is not a significant deterrent for firms investing in China regardless of the initial environmental condition. I do not find any evidence supporting PH behavior in these adjusted models either.

Addressing endogeneity and robust check: One major issue about this paper is environmental stringency may itself be endogenous, thus blurring the relationship between stringency and FDI location choice. The major source of endogeneity is two-way causality. Foreign investments are generally considered as increasing pollution, and force local authorities to enhance regulation enforcement, thus FDI may also affect average levy. However, in order to address this concern, we used lagged average levies, making the previous year's average levy uninfluenced by current year's FDI and also preventing any contemporaneous correlation between the levy and error terms.

Another argument is that foreign investors might negotiate pollution levies with local authorities prior to choosing where to invest. That would make levy itself a function of the location choice of firms. OECD studies also provide evidence that local Environmental Protection Boards (EPBs) often negotiate the levels of fees with firms, especially when local leaders believe the firms are important for the local economy. However, the OECD study also notes that such negotiations take place after the EPBs issue notices to collect discharge fees. Therefore, such negotiations occur after location decisions have been made by the firm (Wang and Wheeler, 2005).Thus, my average levy variable should correctly signal de facto stringency, due to tighter regulations, better enforcement or both.

Besides endogeneity, another issue that may affect the results is autocorrelation. However, since the estimate coefficient of the key explanatory variable—levy, is not statistically significant, adjusting for autocorrelation will just increase standard errors and make the coefficient even more insignificant. Thus, an autocorrelation check is not necessary here.

V. Conclusion:

As the host to the largest share of FDI to the developing world, many economists fear China has become a "pollution haven". Because of the variation of environmental stringency among different provinces, we can test for the pollution haven effect within China. I have created and analyzed a new compilation for new FDI projects into China during 1996-2003 in different provinces. This analysis using two-way fixed effects and province specific-trends shows no evidence of PH behavior in the country. In addition, FDI in different provinces in China does not respond significantly to relative changes in provinces' environmental regulation stringency regardless of initial provincial environmental conditions.

This also implies that FDI will not be deterred from provinces with relatively stringent pollution regulation. Thus, the Chinese government can improve environment quality by imposing a stringent environment policy without the fear of deterring FDI.

Due to limited data for China, this paper does not estimate the effect of industry pollution intensity, which is argued to be important in the test for PH behavior. Also, a county-level data set may provide a more accurate estimate. Besides these concerns, profit-maximizing behavior implies that PH behavior is conditioned by technology. Understanding how differential technology affects PH behavior is left for future research.

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Appendix:

Figure 1.

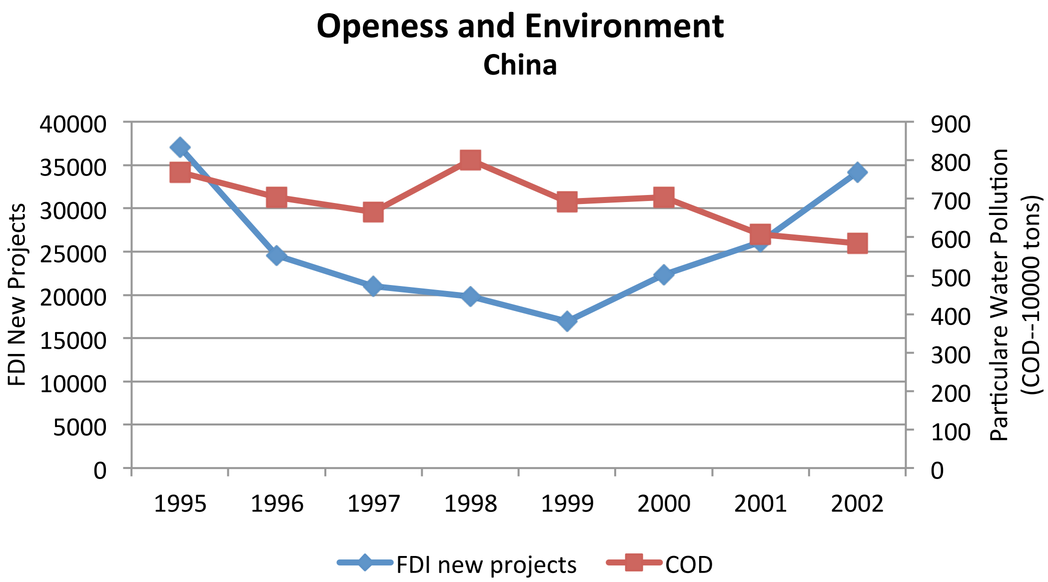


Table 1.
Provincial characteristics:

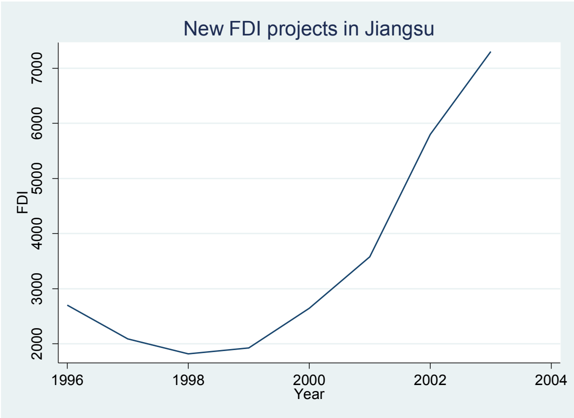
Province	FDI	Water pollution levies (10000 yuan)	Wastewater (100 million tons)	Water levy (yuan/ton wastewater)	Roads (km/km^2 area)	Railroad (km/km^2 area)	Telephones per 1000 people	Skilled labor (%)	Unskilled labor (%)	Cons. p.c (1000 yuan)
Anhui	288	686.12	6.95	0.10	0.33	0.014	360.48	0.14	0.20	2.85
Chongqing	194	160.84	6.80	0.04	0.33	0.007	492.39	0.15	0.14	3.49
Fujian	1870	1262.89	6.11	0.21	0.41	0.009	793.01	0.19	0.18	5.38
Gansu	72	690.83	2.98	0.24	0.08	0.005	441.95	0.21	0.33	2.17
Guangdong	4877	1695.24	11.87	0.14	0.54	0.007	968.82	0.21	0.10	6.28
Guangxi	283	1003.24	8.75	0.11	0.21	0.009	382.03	0.14	0.12	2.88
Guizhou	65	341.97	2.46	0.15	0.20	0.009	259.88	0.14	0.29	1.92
Hainan	195	219.76	0.71	0.31	0.51	0.006	624.63	0.22	0.15	3.31
Hebei	607	2005.20	9.28	0.22	0.31	0.021	493.10	0.19	0.12	3.03
Heilongjiang	301	1384.89	5.84	0.25	0.12	0.011	823.65	0.25	0.10	4.55
Henan	324	1602.08	10.01	0.17	0.36	0.017	407.98	0.17	0.14	2.61
Hubei	425	3653.29	11.64	0.32	0.33	0.011	569.21	0.22	0.16	3.36
Hunan	401	490.30	12.61	0.04	0.30	0.011	428.57	0.19	0.11	3.27
Inner Mongolia	96	228.61	2.51	0.09	0.05	0.005	562.01	0.26	0.19	3.15
Jiangsu	3482	2018.90	21.88	0.09	0.34	0.008	649.92	0.24	0.19	4.71
Jiangxi	409	502.00	4.99	0.10	0.25	0.013	417.13	0.18	0.13	2.74
Jilin	414	980.72	3.99	0.25	0.19	0.019	890.96	0.30	0.09	3.95
Liaoning	1901	1644.00	11.57	0.14	0.30	0.025	1025.42	0.26	0.09	5.40
Ningxia	31	64.30	0.95	0.07	0.19	0.014	744.27	0.24	0.29	3.02
Qinghai	30	124.57	0.44	0.28	0.03	0.002	523.56	0.23	0.55	3.08
Shaanxi	211	1063.75	3.26	0.34	0.21	0.011	519.38	0.24	0.18	2.50
Shandong	2781	1637.63	10.62	0.16	0.41	0.016	480.45	0.20	0.21	4.18
Shanxi	93	1353.45	3.83	0.35	0.31	0.017	549.54	0.20	0.09	2.76
Sichuan	289	724.23	12.47	0.06	0.19	0.005	379.25	0.15	0.17	2.41
Xinjiang	56	154.49	1.73	0.12	0.03	0.001	655.01	0.28	0.13	4.08
Yunnan	139	407.85	3.86	0.11	0.28	0.005	420.01	0.11	0.28	2.78
Zhejiang	1988	1576.64	12.02	0.13	0.39	0.009	785.46	0.21	0.18	5.43

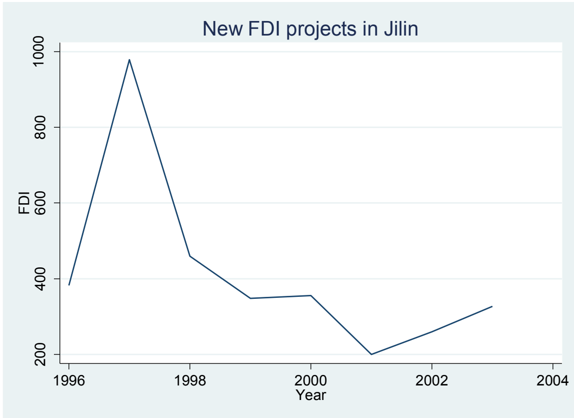
Table 2.

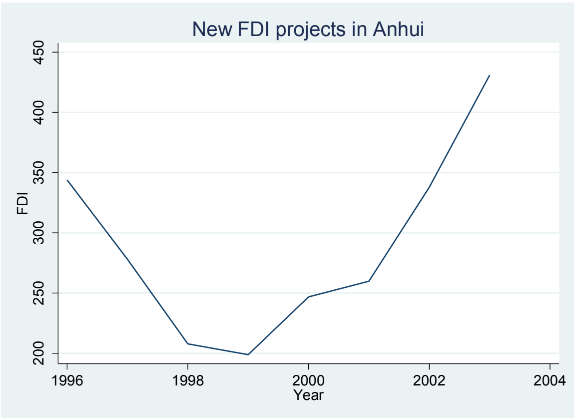
Data definitions and sources:

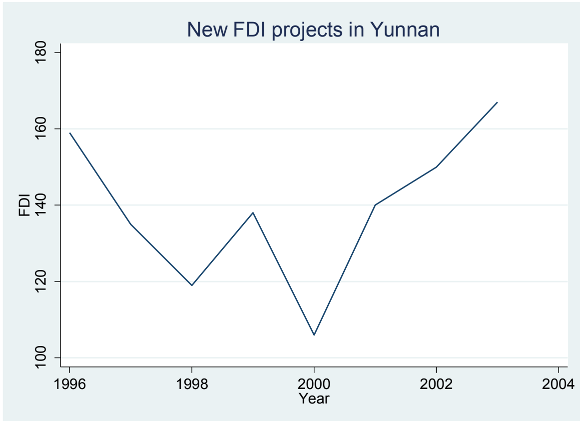
Variable	Definition	Source
fdi	Number of new FDI projects	Chinese Province Yearbook, various years
lag_aclofw	Total collected water pollution levies/wastewater (yuan/ton)	Chinese Environmental Yearbook, various years
lag_roads	Roads (10000 km)	China Statistical Yearbook, various years
lag_railroad	Railway (10000 km)	China Statistical Yearbook, various years
lag_tele	Number of year-end urban telephone subscribers (10000 units)	China Statistical Yearbook, various years
Skilled labor	Percent of population with senior secondary school or higher education relative to semi-skilled labor	China Statistical Yearbook, various years, and calculated by author
Unskilled labor	Percent of population who are either illiterate or have less than primary level education relative to semi-skilled labor	China Statistical Yearbook, various years, and calculated by author
Semi-skilled labor	Population with primary or junior secondary education level	China Statistical Yearbook, various years
Consumption per capita	Consumption (1000 yuan)/population	China Statistical Yearbook, various year, and calculated by author
sezorocc	Dummy variable for a province with either SEZ or OCC	Constructed by author

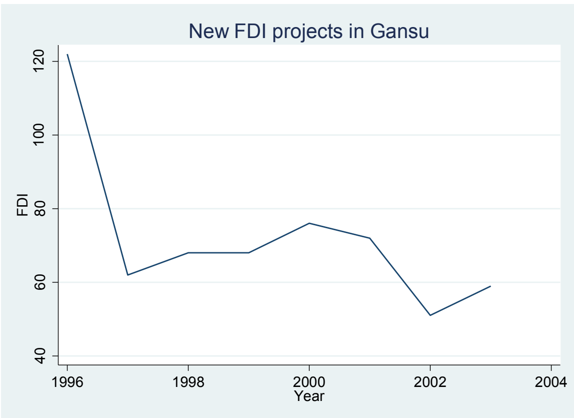
Figure 2.











Notes:

1. Jiangsu: costal province
2. Jilin: northeast province
3. Anhui: inland province
4. Yunnan: southwest province
5. Gansu: northwest province

Table 3.

	Two-way Fixed Effect		Province specific-trend	
	Model (1)	Model (2)	Model (3)	Model (4)
VARIABLES		**New FDI Projects**[1]		
Levy[1]	0.0133	0.0444	1.87e-05	0.0278
	(0.0309)	(0.0269)	(0.0316)	(0.0282)
Roads		2.763***		2.532***
		(0.494)		(0.640)
Railroad		26.02*		45.60***
		(15.48)		(13.62)
Telephones		-9.08e-05		-1.40e-05
		(0.000226)		(0.000234)
Skilled labor ratio		2.739***		1.065
		(0.773)		(0.745)
Unskilled labor ratio		-1.723***		0.829*
		(0.435)		(0.479)
Consumption P.C.		0.251***		-0.149**
		(0.0564)		(0.0687)
SEZ or OCC		0.0466		0.207**
		(0.0676)		(0.0856)
Constant	5.901***	4.457***	-40.26***	16.84
	(0.0888)	(0.269)	(14.36)	(53.87)
Provincial fixed effects	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	No	No
Province specific-trend	No	No	Yes	Yes
Observations	207	204	207	204
R-squared	0.229	0.482	0.492	0.638
Number of id	27	27	27	27
Standard errors in parentheses				
***** p<0.01, ** p<0.05, * p<0.1**				

1. Variables are in natural log.

Table 4.

	Two-way Fixed Effects		Province Specific-trend	
	Model (1)	Model (2)	Model (3)	Model (4)
VARIABLES	New FDI Projects[1]			
Levy[1]	0.0304	0.0318	0.0452	0.0459
	(0.0511)	(0.0452)	(0.0539)	(0.0482)
Levy[1]*Pollution intensity	-0.0267	0.0197	-0.0689	-0.0278
	(0.0634)	(0.0567)	(0.0665)	(0.0598)
Roads		2.762***		2.544***
		(0.496)		(0.642)
Railroad		26.66*		44.85***
		(15.63)		(13.76)
Telephones		-9.53e-05		-4.27e-06
		(0.000227)		(0.000235)
Skilled labor ratio		2.747***		1.032
		(0.776)		(0.750)
Unskilled labor ratio		-1.733***		0.824*
		(0.437)		(0.481)
Consumption P.C.		0.254***		-0.149**
		(0.0573)		(0.0689)
SEZ or OCC		0.0517		0.205**
		(0.0693)		(0.0860)
Constant	5.907***	4.437***	-42.45***	17.13
	(0.0901)	(0.276)	(14.51)	(54.02)
Provincial fixed effects	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	No	No
Province specific-trend	No	No	Yes	Yes
Observations	207	204	207	204
R-squared	0.230	0.482	0.496	0.638
Number of id	27	27	27	27
Standard errors in parentheses				
***** p<0.01, ** p<0.05, * p<0.1**				

1. Variables are in natural log.